

FIG. 1

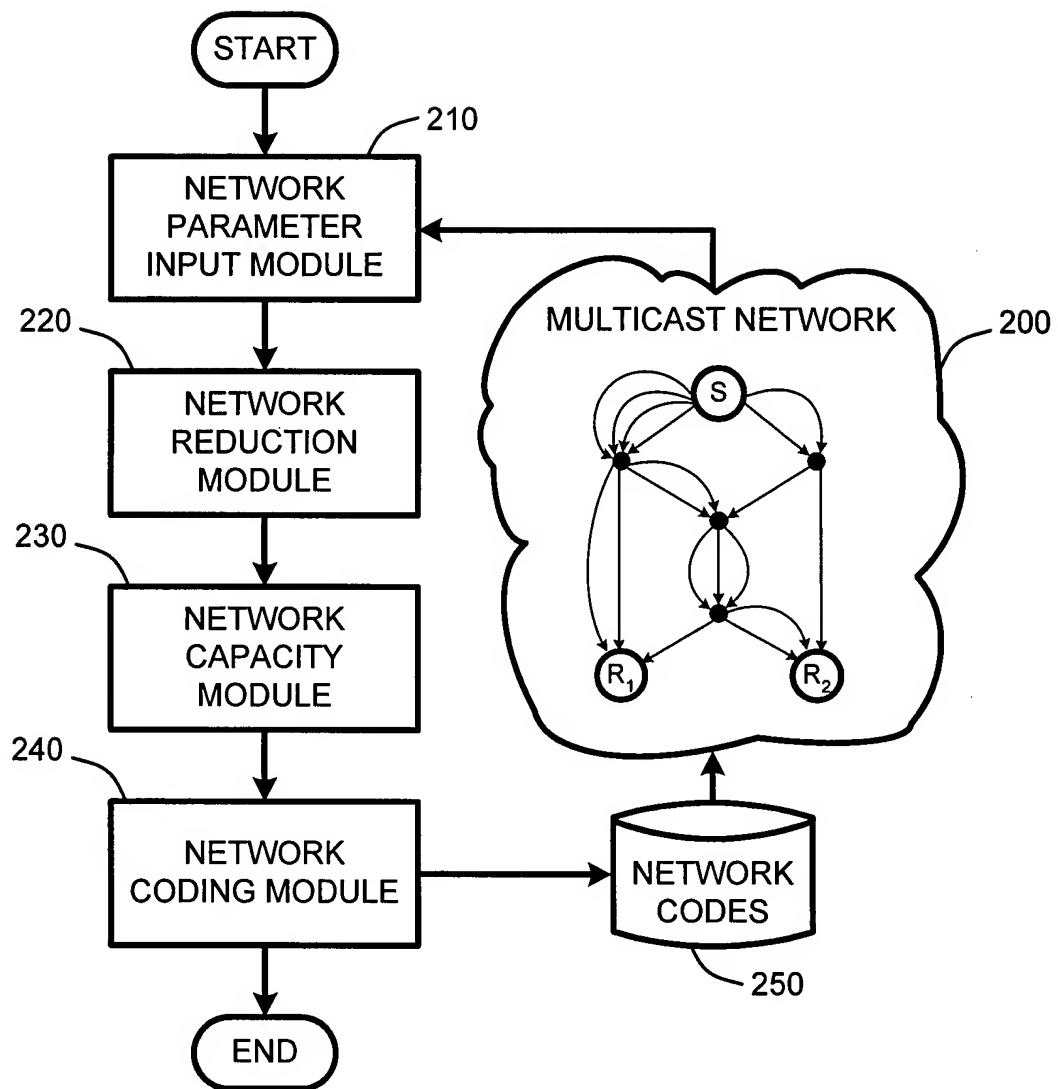


FIG. 2

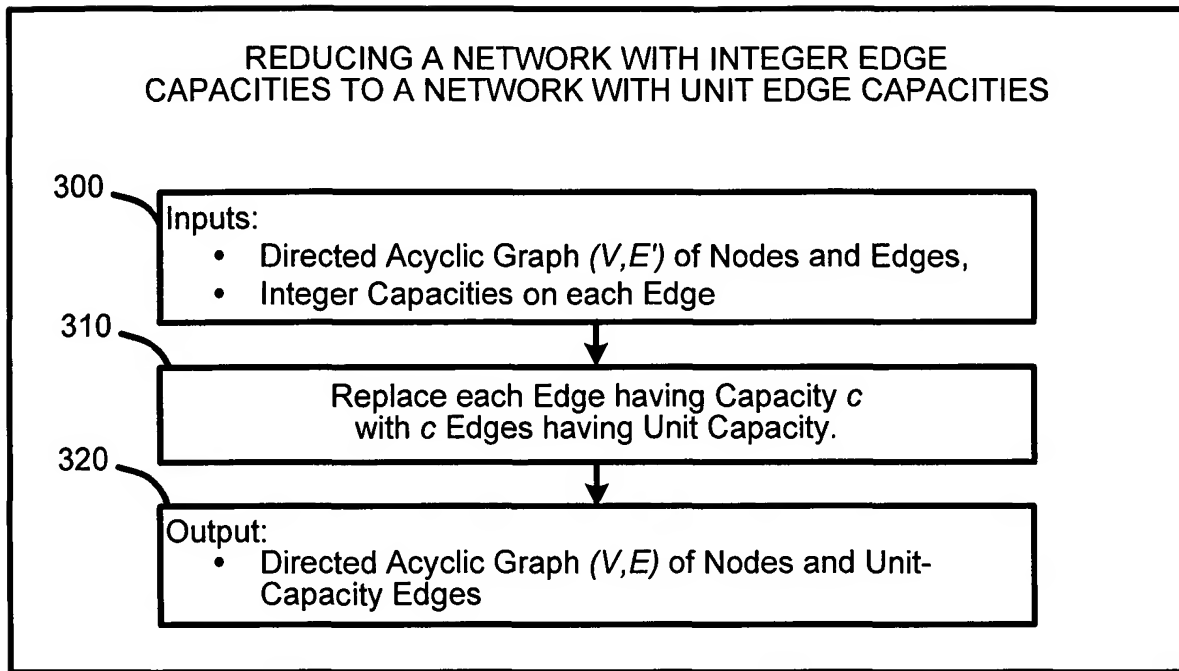


FIG. 3

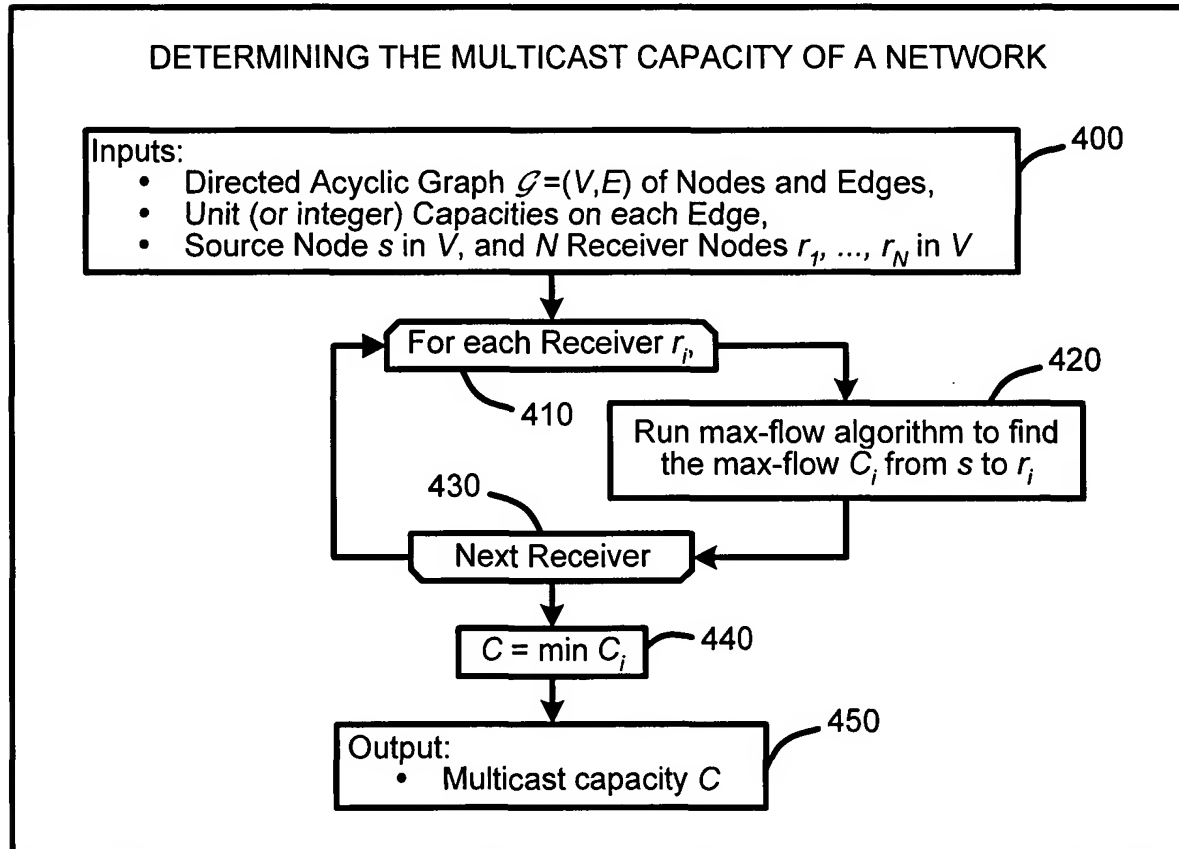


FIG. 4

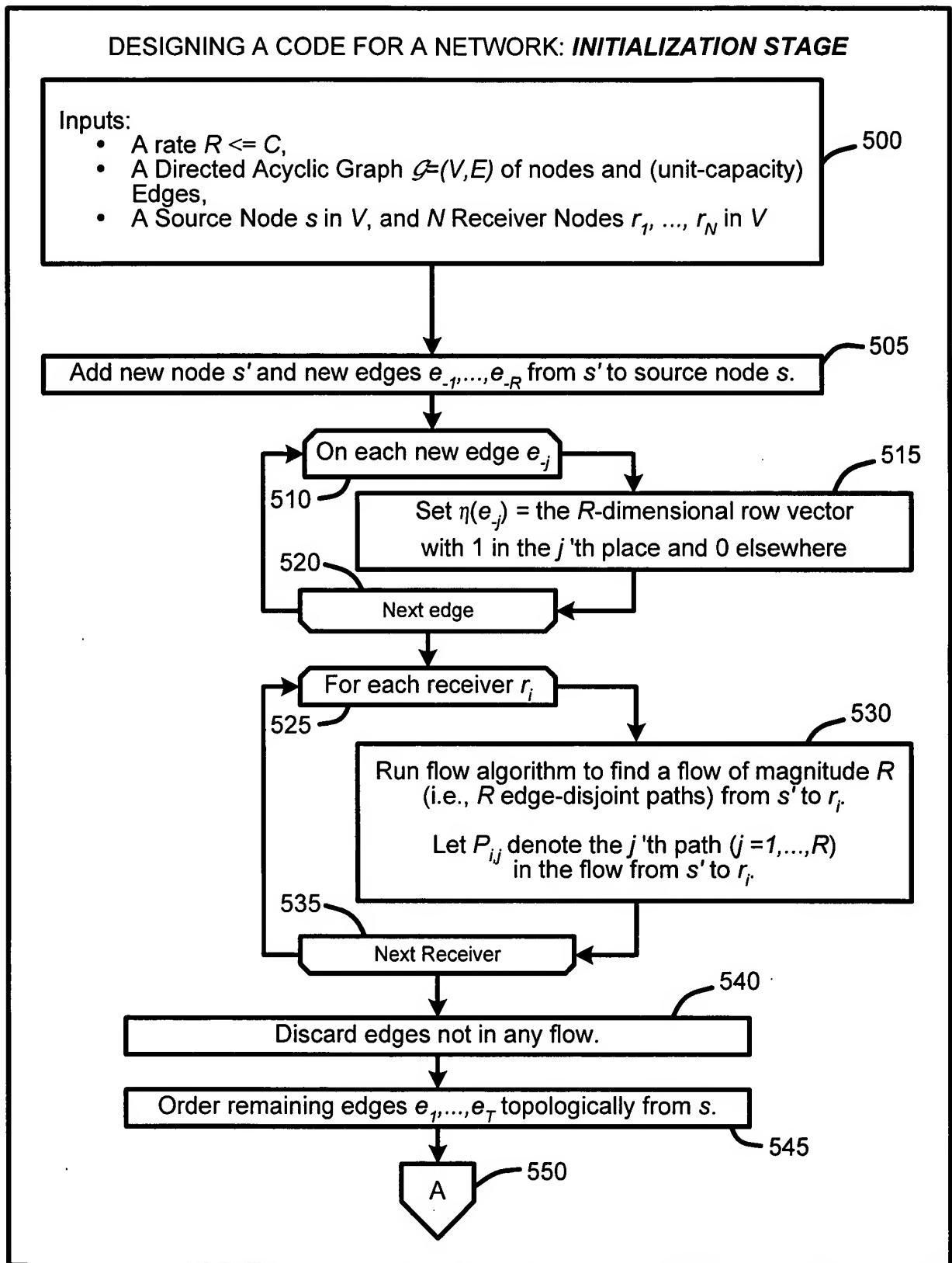


FIG. 5

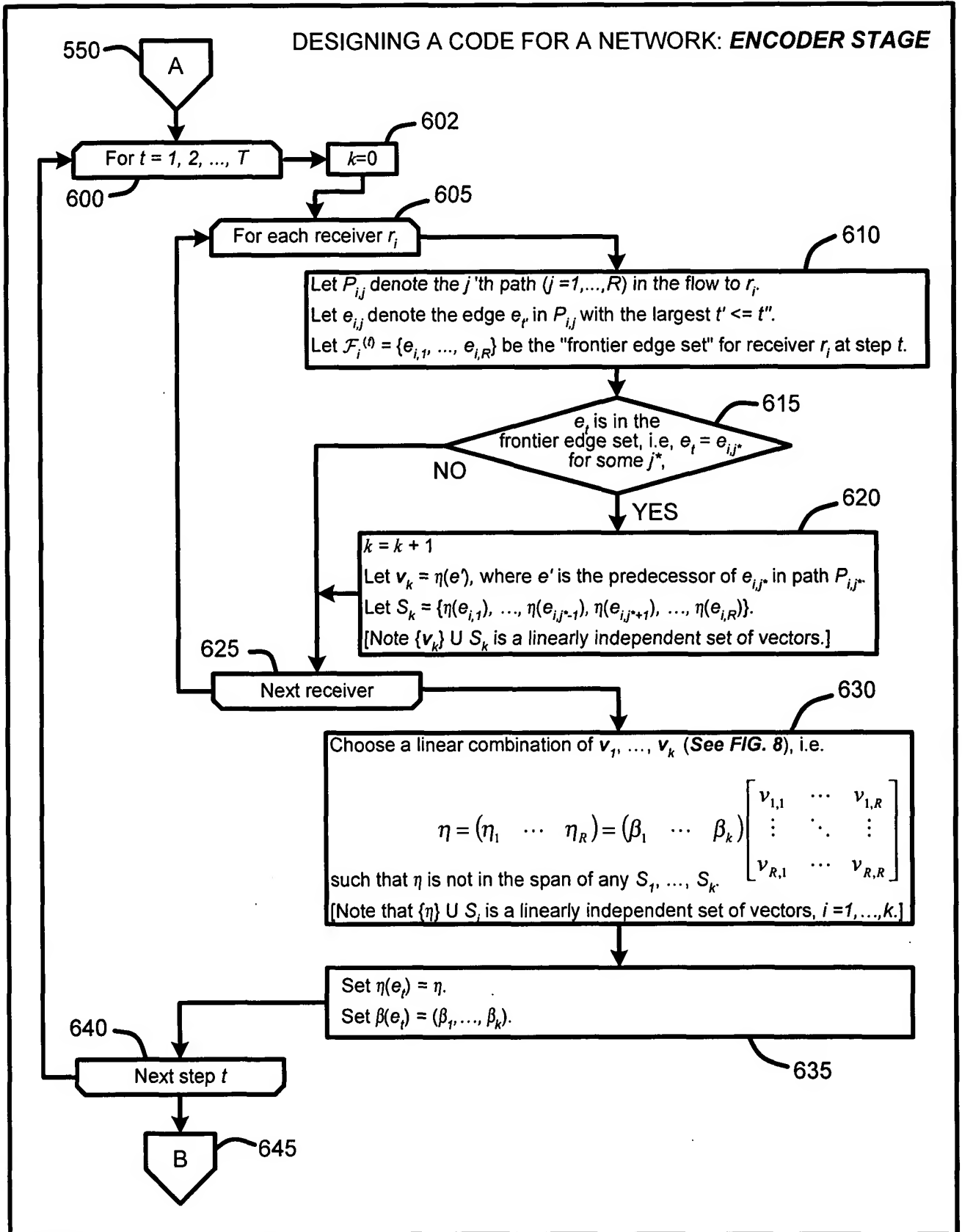


FIG. 6

DESIGNING A CODE FOR A NETWORK: **DECODER STAGE**

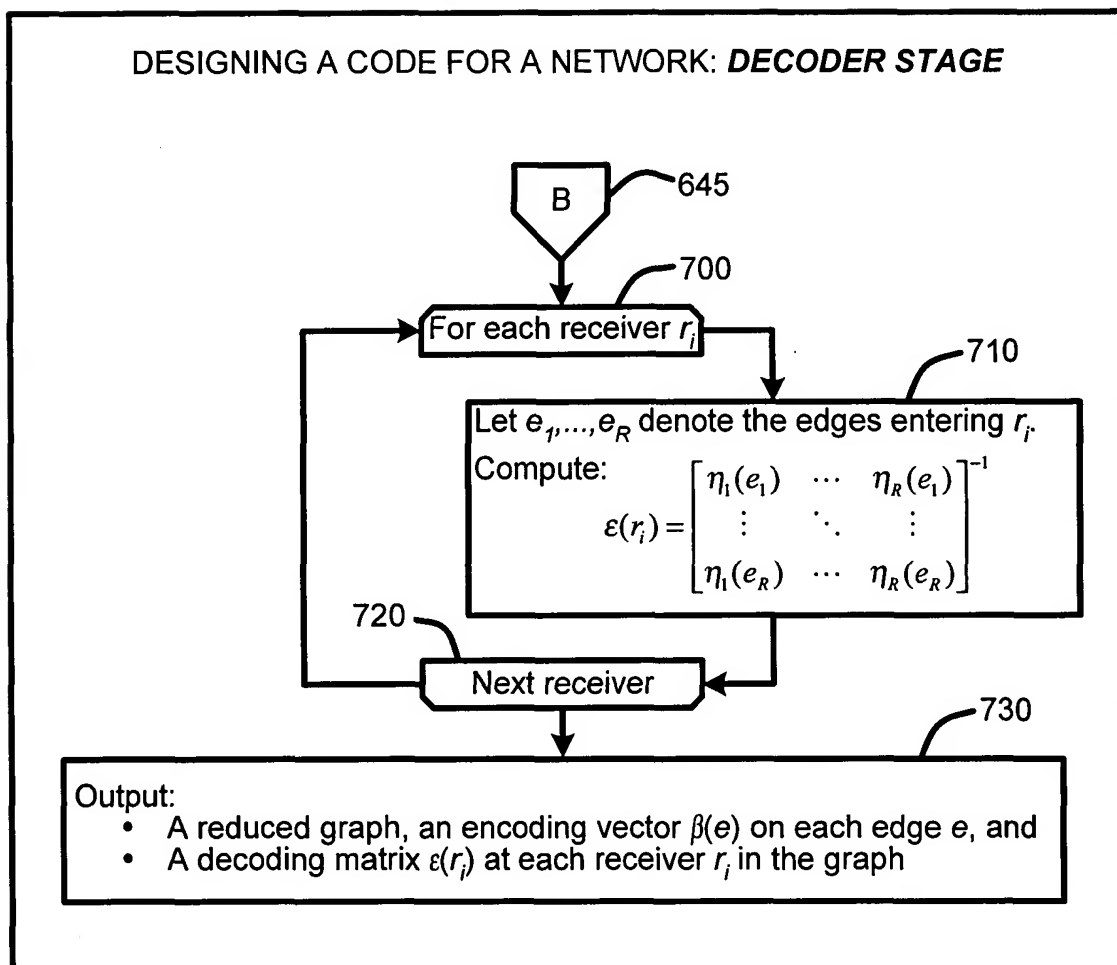


FIG. 7

**CHOOSING A LINEAR COMBINATION OF v_1, \dots, v_k
NOT IN THE SPAN OF ANY S_1, \dots, S_k**

Input:

- R -dimensional vector v_i , and
- set of $R-1$ R -dimensional vectors S_i for $i = 1, \dots, k$

Denote by L the vector space spanned by v_i , for $i = 1, \dots, k$. Compute the set of vectors v_i , for $i = 1, \dots, k'$, spanning L . k' is less than or equal to k . Renumber the indices if needed.

For $j = 1, \dots, k$
By Gaussian elimination compute a vector Z_j in L such that for any vector y in S_j , $y \cdot S_j = 0$.

Now we have to find a vector v in L such that $v \cdot Z_j$ is not zero for $j = 1, \dots, k$. Assume vectors Z_j , $j = 1, \dots, k''$ are linearly independent and all other Z_j , $j = k''+1, \dots, k$ can be written as linear combinations of these. Renumber the indices if needed.

Find c_j , $j = 1, \dots, k''$ by solving the following system of linear equations which gives v (See FIG. 9).

$$v \cdot Z_j = c_j, j = 1, \dots, k''.$$

Note that the solution to the above set of equations may not be unique and one of the solutions can be calculated by Gaussian elimination.

Output:

- R -dimensional vector $v = \sum_{i=1}^k \beta_i v_i$ and
- k coefficients β_1, \dots, β_k

FIG. 8

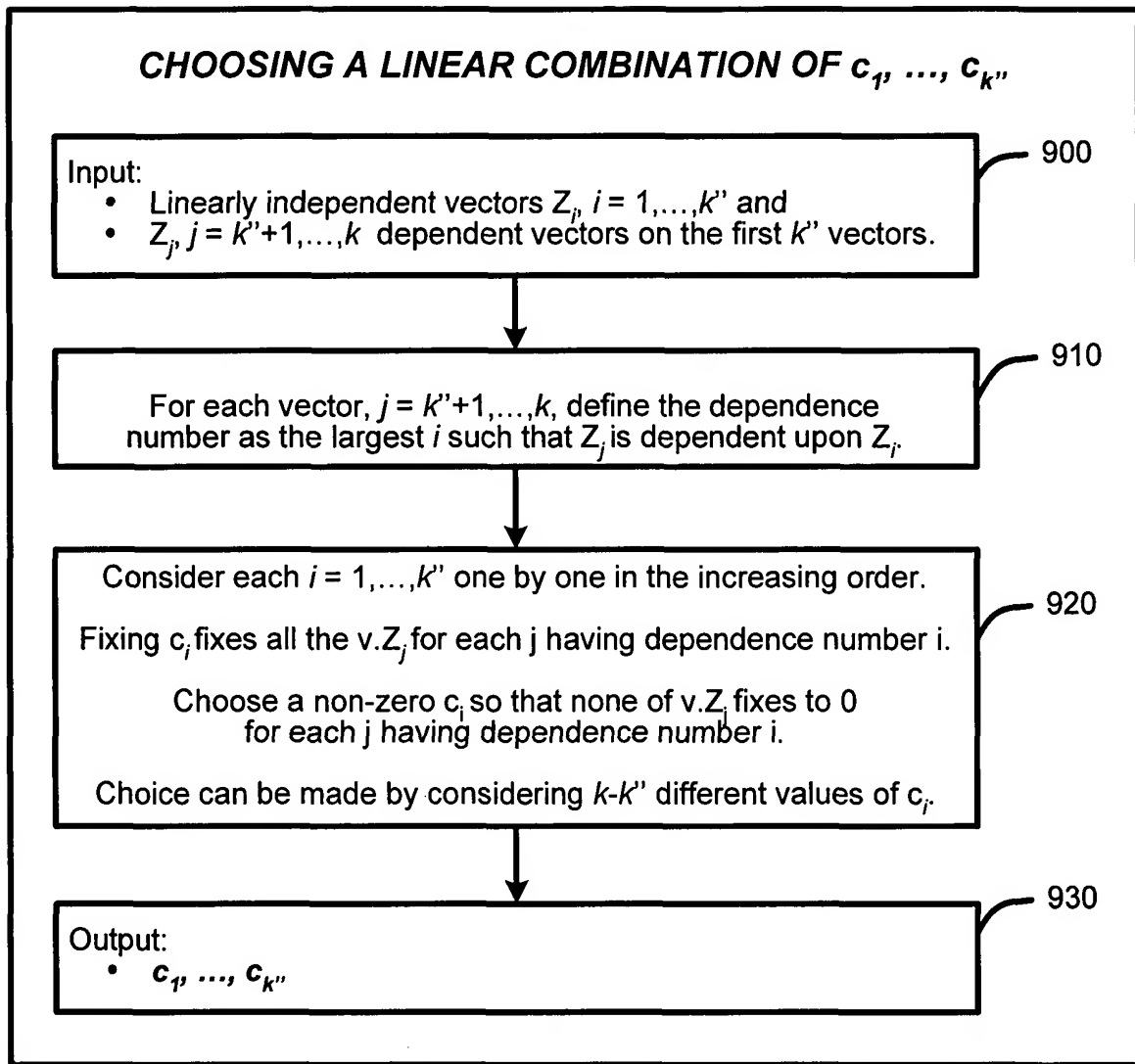


FIG. 9

MULTICASTING $R \leq C$ SYMBOLS PER UNIT TIME FROM THE SOURCE TO EVERY RECEIVER

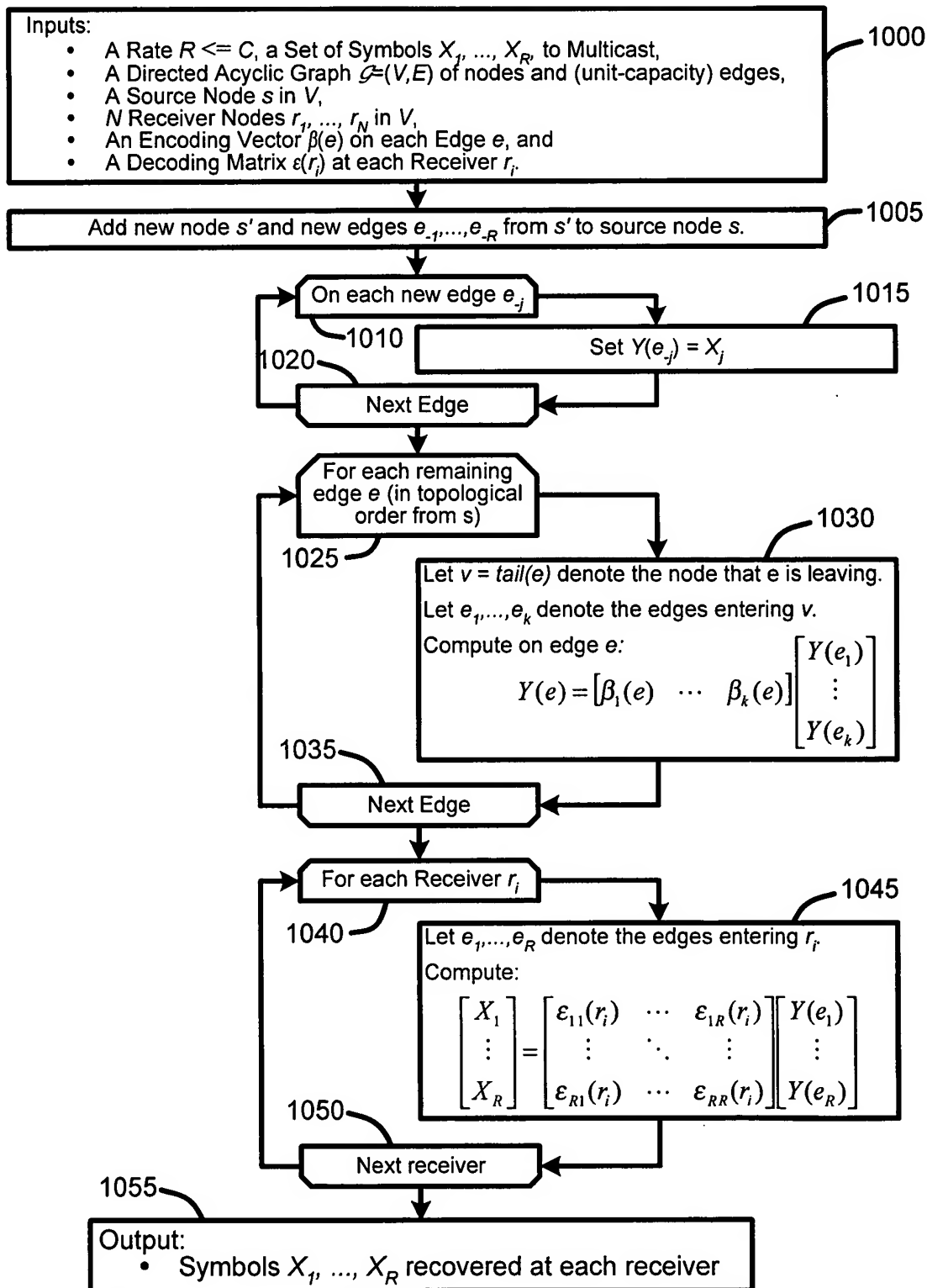


FIG. 10